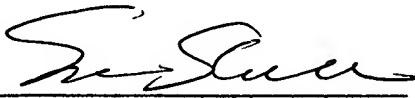


16.6.3 and 16.6.3.1 are regarded in the fire fighting industry as requiring that fire fighting pumps come equipped with a 2.5" or pony inlet. Both submission are relevant to the Examiner's new comment regarding pump inlet sizes.

Respectfully Submitted,

8/18/6
Date


Sue Z. Shaper
Attorney/Agent for Applicant(s)
Reg. No. 31663

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Houston, Texas 77027
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Doct Avail



"Daniel" said none of the pumps had a
pony (2 1/2") inlet. 8/8/06 SRS



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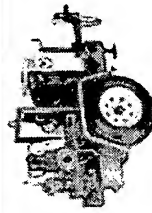
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All Rain for Rent pumps have an end suction centrifugal pump with a fully automatic priming system incorporated into the design. This enables the pump to self-prime from completely dry conditions, even with extended suction lines. Liquid is not required to prime the pump, and therefore, in temporary dry conditions, the pump will 'snore' until such time as liquid is available

Power Prime Pumps

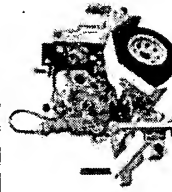
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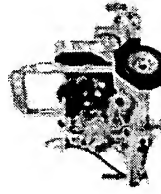
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Size is 3" x 3"
500 GPM maximum
138 FT Head
maximum



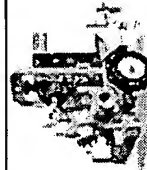
DV-80M
Size 3" X 3"
600 GPM Max
95 Ft Head Max



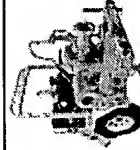
DV-100
Size is 4" x 4"
800 GPM maximum
115 FT Head
maximum



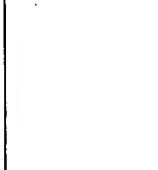
DV-150
Size is 6" x 6"
2250 GPM maximum
160 FT Head maximum



DV-200
Size is 8" x 8"
3100 GPM
maximum
152 FT Head
maximum



DV-200c
SIZE 8"x8"
4,500 GPM MAX
255 FT HEAD MAX
81% Hydraulic Efficiency

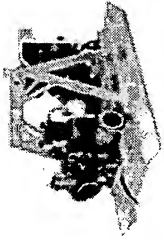
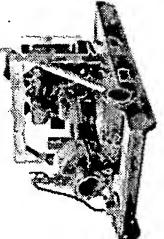
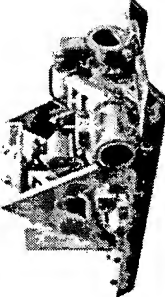
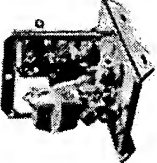
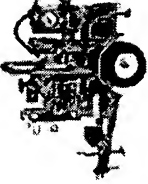



DV-300
Size is 12" x 10"
5000 GPM
maximum
100 FT Head
maximum

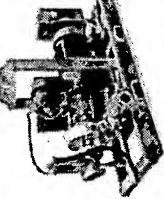
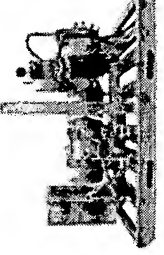

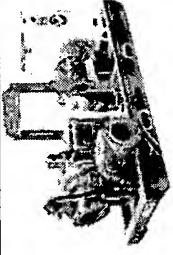


DV-300i
Size 12" x 12"
6,900 GPM max
197 ft head max

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DV-350 Size 14" X 14" 8,000 GPM Max 100 Ft Head Max	DV-350c Size 14" x 14" 13,500 GPM MAX 180 FT. HEAD MAX
	
DV-400 Size 18" X 16" 16,000 GPM Max 200 Ft. Head Max	VMX-150 Size 6" X 6" 2,300 GPM Max 160 Ft Head Max
	
VP-150 Size is 8" x 6" 2250 GPM maximum 110 FT Head maximum	VP-500 Size is 24" x 20 22000 GPM maximum 123 FT Head maximum

Electric & Recessed Pumps

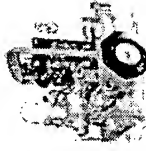
	
DV-100 Electric Size is 4" x 4" 680 GPM maximum 72 FT Head maximum	DV-150 Electric Size is 6" x 6" 2000 GPM maximum 100 FT Head maximum
	
DV-200 Electric Size 8" X 8" 2750 GPM Max 128 Ft Head Max	DV-300 Electric Size is 12" x 10" 5000 GPM maximum 115 FT Head maximum
DV-100 Recessed	DV-150 Recessed

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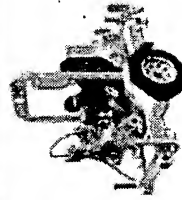
Size is 4" x 4"
800 GPM maximum
70 FT Head maximum



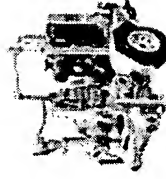
Size is 6" x 6"
2600 GPM maximum
75 FT Head maximum



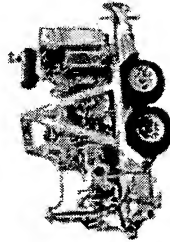
High Head Pumps



HH-80 3 x 3
Size is 3" x 3"
450 GPM maximum
300 FT Head maximum



HH-125 6 x 4
Size is 6" x 4"
800 GPM maximum
370 FT Head maximum



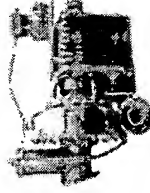
HH-150 8 x 6
Size is 8" x 6"
2250 GPM maximum
320 FT Head maximum



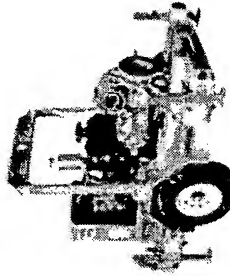
HH-200i
Size 8" X 8"
4,500 GPM Max
450 Ft Head Max



XH-100 6 x 4
Size 6" X 4"
1,250 GPM Max
605 Ft Head Max



XH-150 8 x 6
Size 8" X 6"
2,400 GPM Max
605 Ft Head Max



Cornell RB
Series - Medium
Head
Flows Up To 4,400
GPM
Up To 370 Ft Head



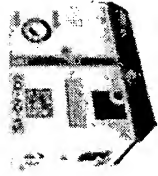
Cornell H Series
- High Head
Flows Up To 1,600
GPM
Up To 475 Ft Head

Sound Attenuated Pumps

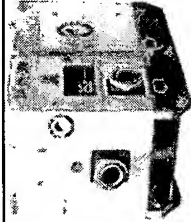
SA-DV-100
SIZE 4" x 4"
800 GPM MAX
115 FT. HEAD MAX

SA-DV-150
Size 6" X 6"
2,250 GPM Max
160 Ft. Head Max

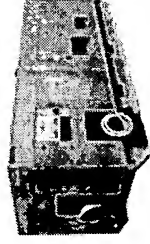
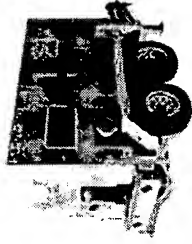
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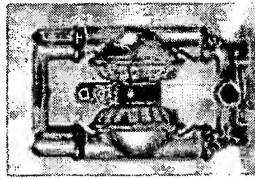
SA-DV-200
Size 8" X 8"
3,100 GPM Max
152 Ft. Head Max



SA-DV-300
Size 12" X 10"
5,000GPM Max
115 Ft. Head Max



Submersibles, Air Compressed, and Others



Air Diaphragm
Primarily 2" and 3" units



Flygt Submersible Pumps
Size 3" X 12"
Flows Up To 5,000 GPM
Up To 310 Ft Head

Hydra Tech Hydraulic Submersible Pumps
Size 4" X 6"
Flows Up To 1,600 GPM
Up To 110 Ft Head



HD-150 6 Hydraulic Submersible
Size is 6"
2000 GPM maximum
108 FT Head maximum

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1901-42

AUTOMOTIVE FIRE APPARATUS

Table 16.2.4.1(a) Suction Hose Size, Number of Suction Lines, and Lift for Fire Pumps

Rated Capacity		Maximum Suction Hose Size		Maximum Number of Suction Lines*	Maximum Lift	
gpm	L/min	in.	mm		ft	m
250	1,000	3	75	1	10	3
300	1,100	3	75	1	10	3
350	1,300	4	100	1	10	3
500	2,000	4	100	1	10	3
750	3,000	4½	110	1	10	3
1,000	4,000	6	150	1	10	3
1,250	5,000	6	150	1	10	3
1,500	6,000	6	150	2	10	3
1,750	7,000	6	150	2	8	2.4
2,000	8,000	6	150	2	6	1.8
2,000	8,000	8	200	1	6	1.8
2,250	9,000	6	150	3	6	1.8
2,250	9,000	8	200	1	6	1.8
2,500	10,000	6	150	3	6	1.8
2,500	10,000	8	200	1	6	1.8
3,000	12,000	6	150	4	6	1.8
3,000	12,000	8	200	2	6	1.8

*Where more than one suction line is used, all suction lines do not have to be the same hose size.

16.2.4.2* The pump manufacturer shall certify that the pump is capable of pumping rated capacity at 150 psi (1000 kPa) net pump pressure at any of the following special conditions when these conditions are specified by the purchaser:

- (1) At an elevation above 2000 ft (600 m)
- (2) At lifts higher than those listed in Table 16.2.4.1(a), or through more than 20 ft (6 m) of suction hose, or both
- (3) For pumps having a rated capacity of 1500 gpm (6000 L/min) or larger, through a single suction hose only, or through the number of hose listed in Table 16.2.4.1(a) attached to one side of the apparatus only

16.3 Pumping Engine Requirements.

16.3.1 The apparatus manufacturer shall approve the use of the pumping engine for stationary pumping applications based on the size of the fire apparatus and the rating of the pump being furnished.

16.3.2 Engine Speed.

16.3.2.1 The engine shall be capable of performing the pumping tests herein specified without exceeding the maximum governed speed of the engine as shown on a certified brake horsepower curve of the type of engine used without accessories.

16.3.2.2 The brake horsepower curve certification shall be signed by a responsible official of the engine manufacturer.

16.3.3 On fire pumps of 750 gpm (3000 L/min) or greater, the engine/pump combination shall be capable of delivering the rated pump capacity at 165 psi (1100 kPa) net pump pressure.

16.3.4* If a separate pumping engine is provided, it shall meet the requirements of 12.2.1.1, 12.2.1.2, 12.2.1.6, 12.2.2, 12.2.3.1, 12.2.3.2, 12.2.4, 12.2.5, and Sections 13.4 and 13.5.

16.3.5 A supplementary heat exchanger cooling system shall be provided for the pump drive engine.

16.3.5.1 Valving shall be installed to permit water from the discharge side of the pump to cool the coolant circulating through the engine cooling system without intermixing.

16.3.5.2 The heat exchanger shall maintain the temperature of the coolant in the pump drive engine not in excess of the engine manufacturer's temperature rating under all pumping conditions.

16.3.5.3 A drain(s) shall be provided to allow draining of the heat exchanger so as to prevent damage from freezing.

16.3.6 Indicator or Light.

16.3.6.1 Where a separate engine is used to drive the pump, an indicator or light that is energized when the pump engine is running shall be provided in the driving compartment.

16.3.6.2 The indicator or light shall be marked with a label that reads "Pump Engine Running."

16.4 Power Train Capability.

16.4.1 All components in the power train from the engine to the fire pump shall be capable of transmitting the torque necessary to power the pump, as installed in the apparatus, for the pump performance points specified in 16.2.3.1 without exceeding the component manufacturer's continuous duty torque rating.

16.4.2 When pumping continuously at each of the pump performance points specified in 16.2.3.1, lubricant temperatures in any power train component installed in the apparatus from the engine to the pump shall not exceed the component manufacturer's recommendation for maximum temperature.

16.4.3* A means shall be provided to limit the nominal net engine output to a torque level equal to the nominal continuous duty torque rating of the weakest component, or to a level equal to the sum of the nominal continuous duty torque ratings of multiple components, if there are multiple devices to be driven simultaneously.

TISSUE SHAVER

NFPA 1901

Standard for Automotive Fire Apparatus

2003 Edition



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An International Codes and Standards Organization

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1901-46

AUTOMOTIVE FIRE APPARATUS

16.6.10 If the suction inlets are to be equipped with a valve, siamese, or adapter that will remain in place while the apparatus is in motion, that valve, siamese, or adapter shall not project beyond the apparatus running board.

16.6.11 The purchaser shall specify if any valve, siamese, or adapter is to be permanently installed on an intake and identify the brand and model of such item.

16.7* Pump Discharge Outlets.

16.7.1* Discharge outlets of 2½ in. (65 mm) or larger shall be provided to discharge the rated capacity of the pump at the flow rates shown in Table 16.7.1.

Table 16.7.1 Discharge Rates by Outlet Size

Outlet Size		Flow Rates	
in.	mm	gpm	L/min
2½	65	250	1000
3	75	375	1400
3½	90	500	2000
4	100	625	2400
4½	110	750	3000
5	125	1000	4000
6	150	1440	5500

16.7.1.1 If the apparatus is equipped with an aerial device with a waterway that is permanently connected to the pump, the discharge from that waterway shall be permitted to be credited as a 1000 gpm (4000 L/min) outlet.

16.7.1.2 A minimum of two 2½ in. (65 mm) outlets shall be provided on any pump rated at 750 gpm (3000 L/min) or greater, and a minimum of one 2½ in. (65 mm) outlet shall be provided on any pump rated at less than 750 gpm (3000 L/min).

16.7.2 Discharge Outlet Connections.

16.7.2.1 All 2½ in. (65 mm) or larger discharge outlets shall be equipped with male National Hose threads.

16.7.2.2* Adapter couplings with special threads or other means for hose attachment shall be permitted to be furnished on any or all outlets.

16.7.3* The piping and valves supplying any preconnected 1½ in. (38 mm), 1¾ in. (45 mm), or 2 in. (52 mm) hose line, including the piping to the preconnected hose storage areas specified in Section 5.6(2), Section 6.5(2), 7.5.2, 8.6.2, Section 9.6(2), or Section 11.7(2), as applicable, shall be at least 2 in. (52 mm) in size.

16.7.4 All discharge outlets, except outlets to which a hose will be preconnected, shall be equipped with caps or closures capable of withstanding a minimum hydrostatic burst gauge pressure of 100 psi (700 kPa) over the maximum pump close-off pressure or 500 psi (3400 kPa), whichever is greater.

16.7.4.1 Where adapters are provided on the discharge outlets, the closures shall fit on the adapters.

16.7.4.2 Caps or closures for outlets 3½ in. (90 mm) and smaller in size shall be removable from the outlet but remain secured to the apparatus.

16.7.5 Each discharge outlet shall be equipped with a valve that can be opened and closed smoothly at the flows shown in Table 16.7.1 at pump discharge gauge pressures of 250 psi (1700 kPa).

16.7.5.1 The flow-regulating element of each valve shall not change its position under any condition of operation that involves discharge pressures to the maximum pressure of the pump; the means to prevent a change in position shall be incorporated in the operating mechanism and shall be permitted to be manually or automatically controlled.

16.7.5.2* Any 3 in. (75 mm) or larger discharge valve shall be a slow-operating valve.

16.7.6 All 1½ in. (38 mm) or larger discharge outlets shall be equipped with a drain or bleeder valve having a minimum ¾ in. (19 mm) pipe thread connection for draining or bleeding off pressure from a hose connected to the outlet.

16.7.7 Any 2 in. (52 mm) or larger discharge outlet that is located more than 42 in. (1070 mm) off the ground to which hose is to be connected and that is not in a hose storage area shall be supplied with a sweep elbow of at least 30 degrees downward.

16.7.8 Valves.

16.7.8.1 Each pump discharge shall have a valve that can be controlled from the pump operator's position.

16.7.8.2 A secondary valve shall be permitted to be provided at a discharge outlet if required for special applications.

16.7.9* Location of Discharge Outlets.

16.7.9.1 No discharge outlet larger than 2½ in. (65 mm) shall be located at the pump operator's panel.

16.7.9.2 If the apparatus has a top console-type pump operator's panel, vertical discharge outlets larger than 2½ in. (65 mm) shall be permitted at the top midship position of apparatus where the outlets are used for directly connected deck guns or monitors and no fire hose is used for coupling the components.

16.7.10 Where the valve-operating mechanism does not indicate the position of the valve, an indicator shall be provided to show when the valve is closed.

16.8 Pump Drains.

16.8.1 A readily accessible drain valve(s) that is marked with a label as to its function shall be provided to allow for draining of the pump and all water-carrying lines and accessories.

16.8.2 The drain valve(s) shall be operational without the operator having to get under the apparatus.

16.9 Pump Operator's Panel.

16.9.1* Each pump control, gauge, and other instrument necessary to operate the pump shall be located on a panel known as the pump operator's panel and shall be marked with a label as to its function.

16.9.2 All gauges, discharge outlets, pump intakes, and controls shall be illuminated to a minimum lighting level of 5 fc (50 lx).

16.10* Pump Controls.

16.10.1 General Provisions. Provisions shall be made for placing the pump drive system in operation using controls and switches that are identified and within convenient reach of the operator.

16.5 Construction Requirements.

16.5.1* Wetted moving parts shall be constructed of a corrosion-resistant material.

16.5.2 Hydrostatic Test.

16.5.2.1 The pump body shall be subjected to a hydrostatic test to a gauge pressure of 500 psi (3400 kPa) minimum for 10 minutes.

16.5.2.2 The pump manufacturer shall provide a certificate of completion for the hydrostatic test.

16.5.3 Where an auxiliary pump is provided in combination with a fire pump and where the pumps are interconnected so that pressure from one pump can be transmitted to the other pump, check valves, intake or discharge relief valves, pump drive gear ratios, or other automatic means shall be provided to avoid pressurizing either pump beyond its maximum rated hydrostatic pressure.

16.5.4 The entire discharge and intake piping system, valves, drain cocks and lines, and intake and outlet closures, excluding the tank fill and tank-to-pump lines on the tank side of the valves in those lines, shall be capable of withstanding a minimum hydrostatic burst gauge pressure of 500 psi (3400 kPa).

16.5.5 Pulsation-Free Fire Streams.

16.5.5.1 The pump shall be capable of producing fire streams that are free from pulsations.

16.5.5.2 When an accumulator is used to provide pulsation-free fire streams, the accumulator shall be constructed and tested in accordance with the ASME *Boiler and Pressure Vessel Code*, Section VIII, Division 2.

16.5.6 The pump shall allow a positive pressure water source to directly add to the pump's net pump pressure.

16.6 Pump Intake Connections.

16.6.1* The pump shall have at least the number of intake(s) required to match one of the arrangements shown in Table 16.2.4.1(a) for the rated capacity of the pump, and the required intakes shall be at least equal in size to the size of the suction lines for that arrangement.

16.6.1.1 The intakes specified in 16.6.1 shall have male National Hose threads if the apparatus is to be used in the United States.

16.6.1.2 If the couplings on the suction hose carried on the apparatus are of a different size than the pump intake(s) or have means of hose attachment other than that provided on the intake(s), an adapter(s) shall be provided to allow connection of the suction hose to the pump intake(s).

16.6.1.3* A sign shall be provided on the pump operator's panel that states the following:

WARNING: Death or serious injury might occur if proper operating procedures are not followed. The pump operator as well as individuals connecting supply or discharge hoses to the apparatus must be familiar with water hydraulics hazards and component limitations.

16.6.2 Intake Strainer.

16.6.2.1 Each intake shall have a removable or accessible strainer inside the connection.

16.6.2.2* The strainer(s) shall restrict spherical debris that is too large to pass through the pump.

16.6.3 At least one valved intake shall be provided that can be controlled from the pump operator's position.

16.6.3.1 The valve and piping shall be a minimum 2½ in. (65 mm) nominal size.

16.6.3.2 If the intake is 2½ in. (65 mm) nominal size, the intake shall be equipped with a female swivel coupling with National Hose threads.

16.6.4 Any 3 in. (75 mm) or larger intake valve except the tank-to-pump intake valve shall be a slow-operating valve.

16.6.5* Each valved intake shall be equipped with a bleeder valve having a minimum ¼ in. (19 mm) pipe thread connection to bleed off air or water.

16.6.5.1 The bleeder valve shall be operational without the operator having to get under the apparatus.

16.6.5.2 If a valved appliance is attached to an intake, it shall be equipped with a ¼ in. (19 mm) bleeder valve on each intake.

16.6.6 Each valved intake having a connection size of 3¼ in. (90 mm) or larger shall be equipped with an adjustable automatic pressure relief device installed on the supply side of the valve to bleed off pressure from a hose connected to the valved intake.

16.6.6.1 The pressure relief device shall discharge to atmosphere, and the discharge shall be piped or directed away from the pump operator's position.

16.6.6.2 The automatic pressure relief device shall be adjustable from a minimum of 90 psi (620 kPa) to at least 185 psi (1275 kPa).

16.6.6.3 The pressure relief device, when preset at 125 psi (860 kPa), shall not allow a pressure rise greater than 60 psi (400 kPa) at the device inlet while flowing a minimum of 150 gpm (570 L/min).

16.6.7 If the pump is equipped with one or more intakes larger than 3½ in. (89 mm) that are not valved, an adjustable automatic pressure relief device shall be installed on the pump system to bleed off excess pressure from a hose connected to the pump intake.

16.6.7.1 The automatic pressure relief device shall be adjustable from a minimum of 90 psi (620 kPa) to at least 185 psi (1275 kPa).

16.6.7.2 The pressure relief device, when preset at 125 psi (860 kPa), shall not allow a pressure rise greater than 60 psi (400 kPa) at the device inlet while flowing a minimum of 150 gpm (570 L/min).

16.6.7.3 The pressure relief device shall discharge to atmosphere.

16.6.8 All intakes shall be provided with caps or closures capable of withstanding a hydrostatic burst gauge pressure of 500 psi (3400 kPa).

16.6.8.1 Intakes having male threads shall be equipped with caps; intakes having female threads shall be equipped with plugs.

16.6.8.2 Where adapters for special threads or other means for hose attachment are provided on the intakes, closures shall be provided for the adapters in lieu of caps or plugs.

16.6.9 Caps or closures for 3½ in. (90 mm) and smaller intakes shall be removable from the intakes but remain secured to the apparatus.